

ATE Readies Technicians for International Competition

The innovative educational practices developed by the National Science Foundation's (NSF's) Advanced Technological Education (ATE) program have been raising the skills of technicians in the United States since the 1990s. Individually and collectively, ATE centers and projects serve as change agents in strategically important fields, such as manufacturing, biotechnology, nanotechnology, information technologies, environmental and engineering technologies, and process technologies.

In early 2007, 258 active grants shared \$45.4 million in funding. ATE project grants provide seed money for educators to test their ideas for enhancing a specific aspect of technician education. Center grants support more comprehensive approaches that connect with industry nationally and serve as resources for other educators to use when developing program improvements.

The direct beneficiaries of ATE programs are diverse populations of students embarking on their careers, incumbent technicians needing updated skills, and technicians' instructors who themselves must

learn constantly to remain current in rapidly changing advanced technology fields. Large and small companies throughout the nation benefit, too, from having well-qualified technicians who arrive ready for work

ATE DATA

Data show strong participation by women and underrepresented minorities in the science, technology, engineering, and math programs affiliated with ATE.

Participation by women in ATE programs averaged from 26% to 32% from 2000 to 2006, according to researchers at the Evaluation Center of Western Michigan University.

Participation by African Americans in ATE programs ranged from an average of 9% to 16%, and participation by Latinos averaged from 8% to 13% during the six-year survey.

Overall the ATE program boosted the academic momentum of technicians and the technological know-how of the nation during the 2000–2006 survey period by

- Offering programs at approximately 800 locations that reached 320,000 two-year

college students, 48,000 secondary school students, and 6,000 students at baccalaureate institutions.

- Providing professional development opportunities to more than 80,000 educators.
- Developing more than 5,000 different educational materials that align with workforce needs and industry standards.
- Creating more than
 - 2,000 two-year college programs.
 - 16,800 two-year college courses and 1,500 secondary school courses.
 - 150 baccalaureate programs and 800 courses; and 2,000 articulation agreements.



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and able to learn new technologies as they emerge.

From small manufacturers to large oil companies, employers report that entry-level technicians prepared in ATE-affiliated programs begin with the equivalent of several years of on-the-job experience as a result of their preparation at community colleges that use ATE innovations. These employers want graduates of ATE-affiliated programs for a simple reason: They contribute to

their companies' bottom lines more quickly than other entry-level employees.

The advent of new technologies and the realities of the worldwide economy mean that in recent years, ATE educators have added international considerations to the multifaceted approaches they use to educate technicians. This broadening of the ATE program makes sense. As Gerhard Salinger, co-lead ATE program director at NSF, explains,

"Technicians, whether employed in small U.S. companies or in large international companies, need to know what global standards and issues are."

This issue of *TECHcitemen* highlights some of the creative ways community college educators have used the NSF's support to address international challenges and prepare technicians whose skills must meet or exceed those available to employers elsewhere in the world. ■

Technicians in Demand Worldwide

There is a "war for global talent," and technicians are among the most highly sought-after workers in an increasingly integrated global economy, according to Branka Minic, director of corporate affairs for Manpower Inc. "Forty percent of employers worldwide have difficulty filling positions," Minic says, citing data that the U.S.-based employment services company gathers for its 4,400 offices in 73 countries.

Manpower's researchers place technicians third and information technology staffers sixth on the top-10 list of jobs that employers worldwide report having the most difficulty filling. Sales representatives and engineers are numbers one and two, respectively. In the United States, technicians are

fourth on the list of difficult-to-fill positions.

Minic, a featured speaker at the 13th National ATE Principal Investigators Conference in October 2006, identifies the agility of educators and their programs as critical for preparing skilled technicians for the technological changes that affect worldwide employment demands.

Minic suggests educators take holistic approaches to teaching students appropriate workplace traits and attitudes, as well as skills. "It is much more difficult to remedy a wrong behavior...than a lack of specific knowledge," Minic explains.

For nations to compete, education and economic development efforts should be synchronized, she

advises. "It is very important that industry, employers, and government work together to make long-term plans to build our workforce to respond to the changing needs of the marketplace."

Minic attributes long-term changes in the marketplace to the growing elderly population; the growth of information industries; mass migration and the growing acceptance of cultural diversity; increasing consumption of oil; and the permeation of technology in the economy and society. ■

For more information, please see
www.manpower.com/researchcenter.

Educators as Critical Agents of Change

- Identify local labor market complexities and trends.
- Partner with employers to design strategic skill development programs.
- Leverage existing resources (e.g., grants, technology, leaders).
- Attract, develop, and retain a diversified student body.
- Take a holistic approach to education—develop skills, traits, and attitudes.
- Prepare students for work by using problem- and case-based learning and creating opportunities for real work experience.
- Educate and train for high-quality performance and top productivity, not for knowledge and aptitude only.
- Respond to market trends and employer needs by agilely adapting programs and methods.

What Employers Want in Technical Employees

- Demonstrated expertise in specific technical skills
- Successful work experience in their industry or with their type of client
- Related degrees, certification, and other proof that their technical skills are current, relevant, and continuously upgraded
- Business skills and acumen
- Project management skills
- Leadership skills
- Ability to work well both individually and in a team environment
- Ability to make sound business decisions

Source: Manpower Research, 2006.

Accreditation Board for Engineering and Technology Endorses International Protocols for Technicians

In the United States, there are no uniform criteria for engineering technicians' credentials or qualifications. An even greater ambiguity exists internationally. Consequently, when accrediting organizations from several nations began talking about the ideal workplace attributes for engineering technicians and technologists, they decided to focus on what entry-level technicians should be able to do rather than on the length of technicians' postsecondary education.

The conversation stretched over several years, but recently the

Accreditation Board for Engineering and Technology (ABET), the voluntary accrediting organization in the United States, added its endorsement to the profiles of attributes and professional competencies contained in the Dublin Accord for technicians, the Sydney Accord for technologists, and the Washington Accord for engineers. Each accord is named for the city where the agreement was either initiated or signed.

ABET, not an original signatory of the Dublin and Sydney accords, now considers the profiles of attributes and professional competencies

for technicians, technologists, and engineers contained within the three accords as nonbinding protocols rather than international standards.

As such, the nonbinding international protocols will be the subject of ongoing research that will be shaped by the feedback ABET receives from educators and industry people, according to Kathryn Aberle, ABET's associate executive director. She encourages all educators involved in technician education to review the protocols and to send comments via e-mail to info@abet.org, regardless of

whether their institutions have ABET accreditation. For more detailed information on the International Engineering Agreements, see www.ieagreements.org.

"They certainly are a thing to start the conversation within the institution about what's truly important to our graduates accredited in the U.S. and [with] international folks," Aberle says. She presented information about the protocols at the 13th National ATE

Principal Investigators Conference in October 2006.

Current students of engineering technician programs may not be directly affected by the effort to reach international consensus. Aberle anticipates, however, that ABET's endorsement of the three accords and the protocols they contain will make it easier for technicians of ABET-accredited programs to move to other countries with the same professional rights

and privileges as people educated within those nations.

Although not binding, the accords already provide multinational companies with information for assessing the qualifications of technicians, technologists, and engineers. ■

For more information, see www.abet.org.

Entrepreneurial Educator Creates InnovaBio to Meet Students' Needs

Tamara L. Goetz was an adjunct biotechnology professor at Salt Lake Community College (SLCC) when she vented to a friend about the paradox then frustrating her efforts to prepare work-ready technicians. Her students needed real laboratory experiences to gain the technical competencies sought by employers. But biotech internships were in short supply, in part because of the highly regulated nature of the industry. Available internships were typically unpaid, which meant they were not an option for her students who had to support themselves or their families.

As the conversation progressed, Goetz thought about a company that would give technicians-in-training opportunities to work on research projects. On a napkin, she

diagramed her plan for a business that combined academics with contract work, quickly dismissing the possibility of a business simulation.

"Why make it a mock company? I'll make a real company," Goetz says of InnovaBio's genesis.

Goetz received an ATE project grant in 2004 to launch her academic startup. In its first two years, 100% of the 56 associate degree graduates with InnovaBio internships obtained jobs immediately. Seventeen high school students who completed InnovaBio internships were hired by biotech companies directly out of high school.

During 2006, the Box Hill Institute in Melbourne, Australia, became InnovaBio's first franchisee. Two European colleges have initiated conversations to become the

"Our whole goal here is to pull industry into our academic training programs in a more substantial way so that it gives students greater opportunity and exposure to that world."

— Tamara L. Goetz,
biotechnology director,
Salt Lake Community College

next franchise operations in what could become an international InnovaBio network. Although called franchises, the colleges do not pay a fee. Goetz considers them strategic partners who test the InnovaBio model and report back on the effectiveness of meshing biotech instruction with internships

at an academic nonprofit contract research organization.

"Our whole goal here is to pull industry into our academic training programs in a more substantial way so that it gives students greater opportunity and exposure to that world. In return, what the companies get out of it is more effective support from our training programs because they're more of a strategic partner in our world," Goetz says.

Her success has encouraged Utah officials to support biotech-related economic development initiatives. Patricia S. Vaughn, director of Talent Access Programs for the Utah Governor's Office of Economic Development, calls Goetz "absolutely visionary" and credits her with persuading state leaders of biotech's potential for growth in Utah.

"To have the governor's office behind us is tremendous," says

Goetz, who is now director of biotechnology at SLCC and director of InnovaBio. Goetz also received additional federal support in 2006 with a \$2 million U.S. Department of Labor grant.

Goetz drew on the expertise of the educators involved in the Bio-Link program to develop the associate degree curriculum for SLCC's students and the "tech prep" biotech program offered at 14 Utah high schools. The Jordan Applied Tech Center, where InnovaBio is located, is a facility the community college shares with the metropolitan area high schools.

"My program is really a hybrid of all their programs," she says, referring to Bio-Link's Web-based clearinghouse of curriculum and instructional materials. Bio-Link is the shorthand name for the National Advanced Technological

Education Center of Excellence in Biotechnology. The center, based at the City College of San Francisco, and its six regional centers have received support from the NSF's ATE program.

Goetz, who attended Bio-Link's summer fellows forum several years ago, routinely runs her ideas past Elaine Johnson, Bio-Link's principal investigator. "She's the first one I call," Goetz says.

In the transition from napkin diagram to functioning contract research organization, Goetz nimbly negotiated issues that are particularly difficult for biotechnology. For instance, InnovaBio opted for payment upfront rather than a share in the intellectual property of the research conducted by students. InnovaBio also limits its work to tasks that fit students' technical abilities and that prepare students for workplaces.

During the first year of the three-year ATE grant, the NSF funds paid for laboratory equipment and consumables, plus the salaries for the full-time professional staff needed to make sure the laboratories comply with various regulations. With each passing year, however, the college and contracting companies have been taking on a greater share of these costs so that by the summer of 2007, InnovaBio will be self-sustaining. In-kind and cash donations to InnovaBio are tax deductible, because it comes under the college's 501(c)3 nonprofit umbrella.

InnovaBio's Sustainability Plan

Salt Lake Community College (SLCC) received an Advanced Technological Education (ATE) grant from the National Science Foundation (NSF) for three years (July 2004 to July 2007) to start InnovaBio. The grant funds were structured to support salaries, consumables, and capital equipment fully during the first year, and they were decreased as the project became more self-sufficient.

- **Year 1**
100% salaries, consumables, and equipment purchases were NSF-ATE grant funded.
- **Year 2**
50% salaries and consumables were NSF-ATE grant funded; 50% of salaries were provided by SLCC, and 50% of the consumables were contributed by the partner contract companies.
- **Year 3**
100% of salary support shifted to InnovaBio. Contract companies provided 100% of consumables.

Source: www.innovabio.org/aboutus.html.

Student Happily Moves Out of Comfort Zone With International Exchange, Internship

The biotech skills Kasey Schuster learned while working on the ATE-funded InnovaBio project at Salt Lake Community College (SLCC) helped him obtain a paid internship at the Box Hill Institute in Melbourne, Victoria, Australia.

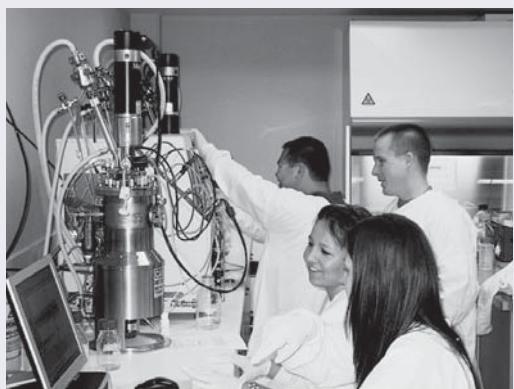
Brendan Grabau, center manager for biotechnology and animal sciences at Box Hill Institute, has nothing but praise for Schuster and his work as a general lab assistant. "He's good. He's well trained. He has good personal skills," Grabau says.

The money Schuster earned as an intern at the institute in Melbourne helped cover the cost of his exchange program. He took classes at the institute toward an advanced diploma in laboratory management. Schuster began taking biotech courses as a high school junior in Utah. He completed an internship with InnovaBio as a senior and was midway through his associate degree program when he opted to participate in the student exchange program. His laboratory work in Australia will count toward his externship-internship requirement for his

degree at SLCC. Immersing himself in a foreign academic and work environment took Schuster out of his comfort zone, but he expects it will add to his marketability.

Much of his internship involved fermentation work, which required that he learn a new set of skills. He also gained experience with histological techniques.

Moving abroad and going beyond what he calls "the rut of doing the same thing every day" pushed him to become a more outgoing person and agile thinker. Communications and problem-solving are among the skills educators and employers refer to as soft skills.



As a paid intern, Salt Lake Community College Biotech Student Kasey Schuster (standing right) supervises other students at the Box Hill Institute in Australia.

"Communications and people skills are some of the hardest ones to learn, and one of the easiest ways of getting better at that is by meeting new people...leaving the U.S. and going to a different part of the world...gives you an opportunity to come in contact with personalities that you may have never found in your own area," Schuster explains. "The key thing I've learned from this exchange is how to cope with a load of cultural differences. And the best part is that I am still finding new things," he says.

For biotech startups, InnovaBio's laboratories and capable student interns have proven to be an economical way to access state-of-the-art laboratories without taking on enormous equipment and personnel costs. Students benefit from the experience of using different lab techniques for a variety of processes and products.

"Tami's kids are not intimidated by anything in the lab," says Douglas Steel, president of PaleoTechnology International. His company is one of eight client companies that contracted with InnovaBio in 2006. Steel serves on InnovaBio's advisory board, as do representatives of the other client companies. He also teaches part-time at SLCC.

With the laboratory operations running well, Goetz plans to ramp up InnovaBio's business office so it, too, will become a learning laboratory. She hopes to offer mentorships for students to develop biotech business plans with guidance from industry leaders. She would eventually like to have venture capitalists review students' proposals, budgets, and marketing plans.

Whether or not SLCC students actually pitch new biotech ideas to investors, Steel says InnovaBio already "teaches them how to be entrepreneurial." With Goetz leading their instruction, they definitely have a real, live entrepreneur to watch and emulate. ■

Irish Educators Interested in Learning From ATE Projects, Centers

Several ATE initiatives are considered potential partners by FÁS, the Irish government agency that educates technicians in Ireland. FÁS is the acronym for Foras Aiseanna Saothair, which is Gaelic for “Training and Employment Authority.” The Irish are particularly interested in learning from U.S. educators with successful programs in manufacturing, biopharmaceuticals, aeronautics, and basic math and science preparation.

They have chosen to explore potential partnerships with the following:

- St. Louis Community College-Florissant Valley (SLCC-Florissant Valley), which has had two ATE project grants for manufacturing initiatives.
- The Center for the Advancement of Process Technology, a national ATE Center of Excellence at the College of the Mainland in Texas City, Texas.
- The Northeast Biomanufacturing Center and Collaborative, an ATE regional center at New Hampshire Community and Technical College.
- Embry-Riddle Aeronautical University, a partner of the National Aerospace Technical Education Center (SpaceTEC), which is a national ATE Center of Excellence at Brevard Community College in Cocoa, Florida.

“Our director general is very keen to have partnerships in the U.S.,” says Ciaran Conlon, FÁS director of training services.

“For a long time, we’ve had partnerships with various European countries, and we have had projects, and we’ve had exchanges of people and curriculum and that type of thing. And we want to extend [them] to the U.S.,” he explains.

All the initiatives were in their preliminary stages at the end of 2006, but the manufacturing partnership had made the most progress in a process that typically takes several years to move from initial conversations to functioning endeavors.

Conlon and three other Irish educators visited the Florissant Valley campus of St. Louis Community College in fall 2006 after attending the 13th National ATE Principal Investigators Conference in Washington, D.C. During a presentation at the conference, Conlon explained Ireland’s four-year apprenticeship programs for technicians. Ireland does not have community colleges.

As with most partnerships, hopes of building on each other’s strengths are driving the connections between the ATE initiatives and FÁS. In the case of the manufacturing partnership, the Irish would like to learn how St. Louis Community College educators cultivated their high-quality relationships with industry. The U.S. educators want to see if aspects of Irish apprenticeships

can be used for preparing technicians at U.S. community colleges.

“They have the faculty and staff that really are connected—very, very impressive,” Conlon says of the St. Louis Community College (SLCC) faculty and staff he met. He said the close linkages with employers were evident in the conversations between college personnel and the representatives of major corporations with operations in the area and in the state-of-the-art equipment in the advanced manufacturing center at the Florissant Valley campus. “Particularly in St. Louis, there was really a go-getter attitude with the faculty and staff; very much in touch with industry.” Conlon says.

Ashok Agrawal, the dean of math, science, engineering, and technology at SLCC-Florissant Valley, has been the principal investigator of two ATE project grants. The current grant uses the recently upgraded manufacturing facilities to reach out to high school students and provide professional development to secondary school teachers. A unigraphics course developed as part of the ATE grant is typical of the fundamental technology courses the college offers to serve a variety of employers.

For his part, Agrawal would like to know more about Irish apprenticeships. He is particularly interested in how the standards-based system accommodates various levels of competency to facilitate technicians’ upward mobility.

Patricia A. Cunniff, a FÁS consultant who coordinated the visit, explained that the initial goal of benchmarking Irish and American curricula is broad enough to allow for exploration of topics that are not directly connected to a particular technical field. Cunniff is an emeritus chemistry professor from Prince George's Community College in Maryland.

Cunniff noted that the Irish educators were curious about the baccalaureate and master's degree courses Southeast Missouri State

University offers on the SLCC-Florissant Valley campus. They also had many questions about the nationally accredited Child Development Laboratory Center that provides day care for the children of students and staff and serves as a learning laboratory for the college's students.

The drop in unemployment that followed many multinational companies opening facilities in Ireland has left few people to watch children. Conlon explained that FÁS has only recently had to consider

making child care available to people in its training programs.

Conlon hopes Agrawal and others from St. Louis Community College will visit Ireland in 2007. "We've extended the invitation for them to come over here. Hopefully they will take that up," he says, adding, "When they do that, then we might see the balance of the exchange." ■

For more information, see
www.slcc.edu/fv/amc/index.html and www.fas.ie.

CARCAM Gearing Up for Automotive Manufacturing Workforce

An ATE-supported consortium of Alabama community colleges prepares the multicraft technicians that international automakers and their suppliers need to keep their highly automated manufacturing facilities running.

"We're not training people to go out and build cars. We're training people to repair the systems that build the cars," says Dale Cox, director of CARCAM, the consortium for the Alabama Regional Center for Automotive Manufacturing.

Automobile production in Alabama has gone from zero in 1996 to 479,465 units in 2005, according to the Economic Development Partnership of Alabama. The state agency estimates that the auto

industry has invested \$7 billion, has created 35,000 jobs, and has the capacity to build as many as 750,000 vehicles annually in Alabama.

Manufacturing has grown in Alabama with the help of tax breaks; streamlined regulatory processes; a deep-water seaport; and five foreign trade zones for duty-free, quota-free entry of foreign goods. The warm climate and low cost of living are among the other amenities Alabama offers.

Mercedes-Benz U.S. International was the first automaker attracted to Alabama. The sports wagons and sports utility vehicles made at its Tuscaloosa facility are expected to make up 20% of the revenues of Mercedes' car group within a few

years. Honda and Hyundai followed with technically advanced assembly facilities of their own. Toyota Motor Corporation and International Diesel build engines in Huntsville.

CARCAM works with these five large corporations and tailors its curriculum to their particular needs. For instance, the instruction for reading blueprints covers the different standards used by the Japanese and German companies.

The automotive manufacturing technology degree (AUT) that CARCAM developed in collaboration with the Alabama Automotive Manufacturing Association (AAMA) has a common technical core, an academic core, and electives that the five colleges in the consortium adjust

to meet the needs of the companies nearest them.

Honda hosts an on-site campus near its assembly plant in Lincoln. The college offers four degree programs in Lincoln and schedules classes to accommodate the rotating shifts of Honda's workers. Other colleges in the consortium are Gadsden State Community College, Jefferson State Community College, Trenholm State Technical College, and Wallace State Community College-Hanceville.

CARCAM coordinates its work with the Automotive Manufacturing Technical Education Collaborative, an ATE project with the Kentucky Community and Technical College System. With the implementation of the new automotive manufacturing technology degree programs in fall 2006, the Alabama community colleges are focusing on preparing the technicians for auto parts suppliers, who want generalists.

"Our real market is the 300 suppliers," Cox says. As the large automakers expand, they hire the most experienced and skilled technicians from the suppliers and other manufacturers.

"We backfill with new talent," Cox says, explaining that those who enroll in the colleges' CARCAM courses include people who are new to manufacturing and incumbent workers who want to advance in their careers by improving their skills.

The AAMA helps with this backfilling process by offering \$1,500 scholarships to two-year college students interested in automotive manufacturing careers. ■

For more information, see www.carcam.org.

CARCAM Collaborates With Other ATE Initiatives

CARCAM not only works with auto manufacturers and suppliers in Alabama, it collaborates with other ATE initiatives aimed at improving the skills of manufacturing technicians in several states. The result is a broad effort to scale up innovative practices from the Midwest to the Deep South.

CARCAM coordinates its work with the Automotive Manufacturing Technical Education Collaborative, an ATE project led by the Kentucky Community and Technical College System. Community colleges in Ohio, Michigan, Texas, Mississippi, and Kentucky are partners on this National Science Foundation grant.

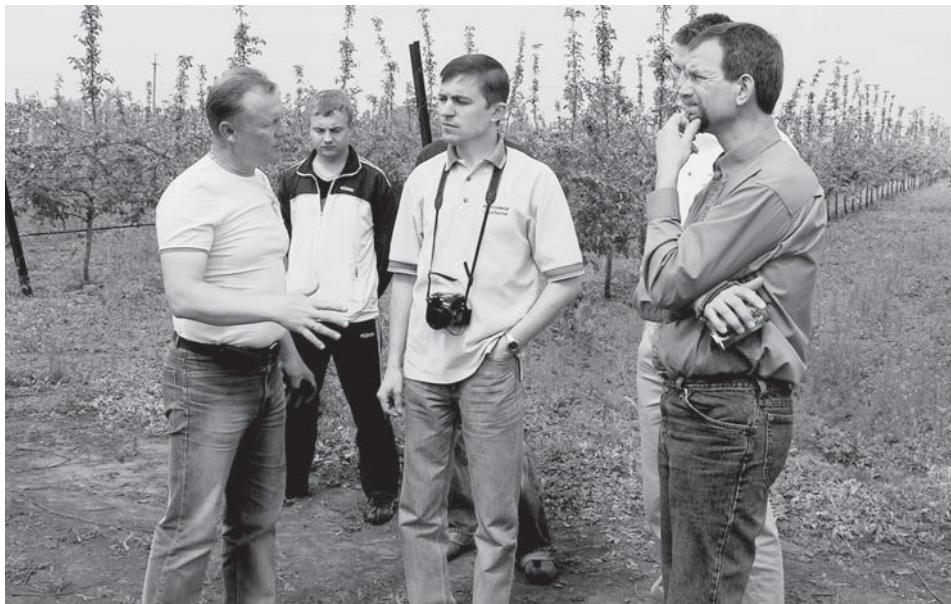
The National Resource Center for Materials Technology Education in Washington and the Florida Advanced Technological Education Center provide advice to CARCAM and professional development for Alabama educators.

AgrowKnowledge's Relationship With Ukrainian Educators Evolves

In its first international foray, AgrowKnowledge helped Alexandr Tarika develop an introductory precision agriculture course for agronomy and agriculture mechanics students at Dnipropetrovsk State Agrarian University (DSAU), a four-year institution southeast of Kiev. After evaluating the Ukrainian educator's

thorough revision of AgrowKnowledge's course during a visit to DSAU, AgrowKnowledge's leaders shared information about Tarika's course with their partner colleges in the United States. AgrowKnowledge is the ATE-funded National Center for Agriscience and Technology at Kirkwood Community College in Cedar Rapids, Iowa.

The mutuality between AgrowKnowledge and DSAU is a new phase in a relationship that started in 2001 when Elizabeth Teles, ATE co-lead program director at NSF, participated in an NSF-State Department Fellowship at the U.S. Embassy in Ukraine. Her conversations with college and university faculty in the "breadbasket"



Olexandr Tarika, middle, a senior lecturer at Dnipropetrovsk State Agrarian University, and Terry Brase, far right, AgrowKnowledge principal investigator, listen while one of Tarika's students explains how he applies modern farming techniques to his apple production business in Ukraine.

of the former Soviet Union led to their connections with AgrowKnowledge. In 2002, Tarika and several other educators from Ukraine participated in AgrowKnowledge's first Critical Issues in Agriculture conference.

The next big step in the evolving relationship will likely involve student and faculty exchanges. The ATE center and the agriculture university signed a new memorandum of understanding in 2006 and plan to share more curriculum. DSAU educators would like to learn about agriculture-oriented entrepreneurship. AgrowKnowledge is developing entrepreneurial curriculum with the University of Iowa and Iowa State University. For its part, AgrowKnowledge would like to learn about land reclamation from DSAU. The

Ukrainians have experience recovering areas damaged by coal mining and other types of mineral extraction. AgrowKnowledge's partner colleges have sought the center's guidance for teaching restorative techniques.

Terry Brase, AgrowKnowledge principal investigator, said in the early years of working with Tarika, he and other U.S. educators learned about international agriculture issues, but they benefited mostly from the intangible reward of helping a fellow educator in a nation still recovering from the dismantling of Soviet-style collective farms. All involved understood that true partnerships take time and can be complicated by language and cultural differences, distance, and the pressure of professional and personal responsibilities.

"Terry and AgrowKnowledge are great contributors of ideas," Tarika says. He is a senior lecturer in the soil science and ecology department at DSAU. Tarika credits AgrowKnowledge with helping him learn how to employ geographic information systems (GIS) and global positioning systems (GPS) in introductory courses for students majoring in agronomy and agriculture mechanics.

The hard-working Tarika has become an expert in precision agriculture since those first lessons. He translated a precision agriculture textbook into Russian as part of his Humphrey Fellowship at Cornell University in 2005. He was a presenter at a national conference in Ukraine and spoke at an Iowa State University seminar during one of his visits to the United States.

Brase describes Tarika as "enthusiastic" and "very innovative." The active involvement of his students is quite different from traditional European-style lectures that discourage student questions.

Tarika's newest projects include persuading DSAU faculty in other disciplines to adapt GIS and GPS into their courses. At the government's request, he is also developing a geospatial database of the rural areas of the Dnipropetrovsk region. "It can be very innovative and useful work," he says. ■

Patience and Attention to Language Help Overcome International Challenges

Exercising patience and utilizing a reduced form of English are ways of overcoming the cultural and linguistic differences that challenge international relationships, according to two educators who have built successful international academic partnerships.

Olexandr Tarika, an agronomy professor at Dnipropetrovsk State Agrarian University in Ukraine, suggests patient understanding and the use of a translator to overcome cultural and language barriers.

"You must be ready to [understand] the difference in the way of doing business here—personal contacts [are a] key point. Often we wait until the deadline. Often we [do not] respond to e-mails right away," Tarika wrote in an e-mail that arrived fewer than 24 hours after a reporter's query.

For language barriers, Tarika recommends obtaining guidance from the public affairs section of the U.S. embassy in the nation of interest. "Not so many of us speak English—you need to find a person who is able to communicate effectively in

your language," he wrote.

John M. Grandin, who leads the International Engineering Program at Rhode Island University, suggests U.S. educators use Globish when corresponding and conversing with colleagues from other countries. Globish, a 1,500 word, idiom-free version of English, is the language often used by international business people. Although not an official language, English for the "global village" has been codified by Jean-Paul Nerriere, a retired IBM vice president, in his 2004 book, *Parlez Globish*.

Grandin points out that when people from several different countries meet, Globish is the language they typically speak because English is the language multi-lingual people often share in common. "Generally they're speaking in a reduced, very basic form of English," Grandin says. It usually works well unless an American is involved in the conversation and they use idioms such as "I'm good," in response to simple questions like whether they want

more coffee, or "Gotcha" when asked if they understand something.

"The irony is that Americans, if they are going to communicate with people around the world, should start with learning Globish," Grandin explains. Grandin also advocates that Americans "start learning languages."

Rhode Island University's engineering program meshes undergraduate engineering courses with instruction in French, German, and Spanish, and places students in internships abroad.

Grandin suggests that community colleges interested in building international partnerships for their technician preparation programs should consider building on the languages spoken by the non-native English speakers among their general student populations. Students need to understand their native languages are "assets" to which they can add technical skills, he says.

Community colleges interested in building international partnerships for their technician preparation programs should consider building on the languages spoken by the non-native English speakers among their general student populations.

Kingsborough Tests Virtual Enterprise Curriculum With New Students, Non-technology Majors

The Institute for Virtual Enterprises (IVE) engages City University of New York (CUNY) students in an array of business simulations that connect at various points with students in 30 other countries, as well as community college and high school students in the U.S.

With the support of an ATE planning grant, educators are testing ways of integrating aspects of virtual enterprises into introductory courses. The ATE grant is part of IVE's ambitious effort to be "a world leader in technology-driven, student-centered simulations in a wide variety of educational settings and disciplines."

The educators, who participated in IVE's development from Kingsborough Community College in Brooklyn to a CUNY-wide initiative, have generally followed the European model of using the computer-based business simulations in capstone courses for business majors. IVE's MarketMaker software includes a bank, stock market, credit card, and inventory system that allows students to trade shares of virtual companies and create, buy, and sell those companies' products.

Virtual enterprises also serve as a platform for teaching leadership and entrepreneurship. In a few instances, student projects have evolved into real businesses.



Students enrolled in a learning community at Kingsborough Community College created NYC Tech Travel, a virtual business, as part of the *veit* program during the winter of 2007.

Virtual Information Technology Enterprises or *veit*, an ATE project of Kingsborough Community College, endeavors to pique students' interest in technical careers and to instill the soft skills employers seek. Edgar Troudt, a Kingsborough instructor and IVE's technology director, says the initiative expanded to include introductory courses taught within learning communities. The goal is to get more students excited about technology.

"What we're trying to do is improve recruitment, retention, and soft skills for high tech majors," Troudt says.

Whether they go into tourism or biochemistry, "students need skills that can transfer to so many different applications," explains Christoph Winkler, IVE program and curriculum director. "There is a strong desire to make the students not only very skilled within their fields but also [to] give them a little bit more."

Winkler and Troudt see virtual enterprises as powerful tools for teaching students to set goals, monitor progress, and reassess strategies. The technology allows students to experiment and make mistakes in a safe environment. "That's the big benefit here,"

“What we’re trying to do is improve recruitment, retention, and soft skills for high tech majors.”

— Edgar Troudt, instructor,
Kingsborough Community College

Winkler says of the many teachable moments that arise from using actual business applications in a setting where the action can be stopped for instruction and guidance.

With a virtual enterprise driving tasks and interactions, students are compelled to be proactive rather than reactive or passive learners. They gain interpersonal skills such as understanding the necessity to use appropriate language in business conversations and e-mails. They also learn intrapersonal skills such as organizing themselves to show up on time and behave

appropriately in a work environment.

During 2006, *veit* curriculum was tested with an initiative for Black men enrolled in college for the first time, an honors program for business and liberal arts majors, a language immersion program, and other learning communities at Kingsborough and CUNY's Queens College. Each of the pilot courses wove information about technical careers into lessons that involved online research, Web page design, electronic commerce, and data management. Virtual businesses were developed by students in the language immersion and honors classes.

“The point is we are trying this at different levels, because we want to see if different populations of

students do well with the *veit* concept,” Troudt explains.

A preliminary evaluation reported that the Black Male Initiative instructor and students found the *veit* curriculum “somewhat helpful” in facilitating learning about data privacy and data management. One student wrote, “I feel the things I've learned here will follow me throughout life and help me to become the successful man I am supposed to be.”

The instructor reported the technology-infused curriculum kept the students engaged during the 13 three-hour summer class meetings and helped improve the students' communication and soft skills. ■

For more information, see www.ive.cuny.edu.

Biomanufacturing Skill Standards Intended for Global Use

The team of educators working with industry on biomanufacturing skill standards and curriculum hope the benchmarks will be used in the United States and abroad. Manufacturers, particularly those in biopharmaceutical manufacturing, expect their U.S. technicians' competencies to match those

of their employees' elsewhere, says Sonia Wallman, director of the ATE-funded Northeast Biomanufacturing Center and Collaborative at New Hampshire Community and Technical College (NHCTC) in Portsmouth.

Industry advisors are working with the regional center, known by

the acronym NBC², on a global biomanufacturing curriculum. Educators and industry collaboratively created the Biopharmaceutical Manufacturing Industry Skills Standards, the first critical step toward a global curriculum, with the support of an ATE project grant.

"It was obvious to all of us that we're dealing with global companies and that whatever we did with them in the Northeast would probably have some relevance to them in Puerto Rico, Ireland, and Singapore," Wallman says.

Some of the students from her associate degree program are already being asked during job

The international scope of the biopharmaceutical industry offers an opportunity for educational institutions to collaborate, rather than compete.

interviews whether they would consider overseas assignments. An alumnus of NHCTC's certificate program was sent by Wyeth BioPharma Biotech to help with

the technologically sophisticated facility in Grange Castle, Ireland, which began operations in 2005. He worked there for a year before returning to Wyeth's Andover, Massachusetts, facility, where he is a senior technician with coordination responsibilities.

Although it is not yet common for U.S.-trained technicians to receive overseas assignments, pharmaceutical products are typically distributed across national borders, depending on consumer demand and a company's licenses.

NBC² is a regional center serving two-year colleges in the Northeast, but Wallman's hope for broader use of the skill standards aligns with its target industry needs.

"In our industry there's never such a regional focus...you are essentially making a medicine that is sold throughout the country," says Robert Konopacz, senior director of biotechnology at Wyeth BioPharma Biotech in Andover. Depending on a company's licenses, medicines made in the United States are sold in

Wyeth Executive Likes Hiring Community College Biotech Grads

Robert Konopacz looks for creative people when hiring and likes the diversity that graduates of community college biomanufacturing programs bring to the technician applicant pool.

Applicants with certificates or associate degrees from programs affiliated with the ATE-supported Northeast Biomanufacturing Center and Collaborative (NBC²) have a head start on the analysis and techniques involved in biomanufacturing that "differentiate" them from other applicants, according to Konopacz. He is senior director of biotechnology for Wyeth BioPharma Biotech's facility in Andover, Massachusetts.

"We get a wide variety of backgrounds and the way people think, so these programs are very valuable to us," Konopacz says, referring to graduates of the NBC² affiliated programs. NBC² is housed at New Hampshire Community and Technical College.

With 300 higher education institutions in New England, Wyeth has a steady supply of applicants for openings at its suburban Boston facility. In 2006, it hired 200 technicians whose academic credentials ranged from graduate equivalency degrees and high school diplomas to associate and bachelor degrees.

"These programs that Sonia [Wallman] has allow them [graduates] to have a better grounding and understanding of what they are going to do versus making razor blades or something else. They get a head start. I've seen value from them. We have hired a number [of people] from them. It differentiates them in the marketplace," he says. Sonia Wallman is the principal investigator of NBC² and leads NHCTC's biomanufacturing program.

Although it typically takes from six months to a year for a new technician to complete every step of Wyeth's internal training, Konopacz has found that graduates of NBC² programs grasp the complex processes more quickly. He estimates that the concentrated learning in biomanufacturing basics provided by the associate degree programs equal what a person hired right out of high school would learn during 10 years on the job.

"They are essentially getting pretrained to my systems," Konopacz says.

other nations and vice versa. Wyeth, for instance, sells products in 140 countries.

Biomanufacturing is a growing field that blends several advanced technologies to create medicines or biopharmaceuticals that are injected rather than taken by mouth. New biopharmaceutical companies and long-established pharmaceutical companies increasingly use biotechnology processes for mass production of medicines from human proteins and other genetically altered materials.

Wallman sees the international scope of the biopharmaceutical industry as an opportunity for educational institutions to collaborate, rather than compete. "There are far too many proteins to be worried about who's going to make them. We all have to make them," she explains.

Wallman's periodic conversations with educators in Ireland, France, and Singapore may eventually lead to formal collaborations between the regional ATE center, its partner institutions, and instructors abroad. At the very least, she anticipates her international colleagues will contribute curricula to the repository of educational materials being created and collected by NBC².

"If we're developing some SOPs [standard operating procedures] for curriculum [and] for training, and say the Irish are using them too. And then Ireland is developing something and we're



A New Hampshire and Community Technical College student injects a sample into high performance liquid chromatography (HPLC) for quality control biochemistry analysis.

using that, isn't that better if we are all educating Wyeth employees?" she asks.

Konopacz says Wyeth and other biomanufacturers will continue to do in-house training to comply with government regulations and keep up with continuously revised procedures. However, he has found that community college programs like those of NBC²'s partner colleges provides technicians who are "faster to train in our system."

Wyeth's comparisons of productivity at its various facilities take into consideration the educational background of the local workforce, the age of the facility, and the complexity of the

automation in it. "You need smart people to understand the automation," Konopacz says. ■

For more information, see
www.biomanufacturing.org.

TECHcitements

ATE Grants Often Lead to Big Innovations

Advanced Technological Education (ATE) project grants from the National Science Foundation frequently serve as critical mechanisms for creating innovative programs that attract students and additional funding.

One example of a dynamic ATE initiative leading to more ambitious, successful programs is found at New Hampshire Community and Technical College (NHCTC). NHCTC leveraged its ATE project grants into a broad program and received support from other federal and foundation sources.

NHCTC used two ATE project grants it received in the 1990s to develop courses that became the cornerstones of its biomanufacturing program. Two grants from the Alfred P. Sloan Foundation helped the college put its hands-on instructional manuals on the Internet. With another ATE project grant, the college worked with industry to develop skill standards for 10 biomanufacturing occupations.

In 2005, the college received an ATE regional center grant to lead the creation of a 12-state collaborative with five community colleges and one technical high school serving as hubs for learning communities that stretch along the Northeastern United States. The collaborative is now busy developing a global biomanufacturing curriculum that aligns with the skill standards.

NHCTC and several of the hubs have also received U.S. Department of Labor (DOL) grants. The college is using its DOL grant to add

equipment, faculty, and staff to expand its offerings for degree-seeking students, high school dual enrollment students, and incumbent workers.

The DOL grant also underwrites a biomanufacturing apprenticeship program that provides 1,000 hours of on-campus instruction with 1,000 hours of on-the-job work experience. Students who enroll in the apprenticeship receive free tuition for their second semester at NHCTC. The grant also pays half of their \$10 per hour wages for their full-time, summer jobs at biomanufacturing companies. Apprentices are expected to work part-time during their second year in the associate degree program.

Several of the hubs are partners on DOL grants that are expected to build their capacities and allow them to replicate NHCTC's apprenticeship program.

The skill standards and curriculum developed with ATE grants laid the groundwork for the new growth and apprenticeships supported by the DOL grant, explains Sonia Wallman, director of the ATE regional biomanufacturing center and collaborative.

Wallman notes that the ATE center grant facilitates the wider use of the apprenticeship model among the network of hub learning communities. "That kind of brings everybody together. It was really awesome that that happened. It sort of completes the circle with these grants," she says.

For more information on the ATE program, please see:

National Science Foundation
www.nsf.gov/ate

ATE Centers Impact
www.atecenters.org

American Association of Community Colleges
www.aacc.nche.edu/ateprogram

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The American Association of Community Colleges (AACC) is the primary advocacy organization for the nation's community colleges. The association represents 1,100 two-year, associate degree granting institutions and more than 11 million students. AACC promotes community colleges through five strategic action areas: recognition and advocacy for community colleges; student access, learning and success; leadership development; economic and workforce development; and global and intercultural education. Information about AACC and community colleges can be found at www.aacc.nche.edu.

